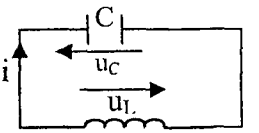
b) Loi des mailles $u_C + u_L = 0 \Leftrightarrow u_C + L\frac{di}{dt} = 0 \Leftrightarrow$



$u_C + LC\frac{d^2uc}{dt^2} = 0.$

c) $U_{max}\ \text{Sin}\ (\omega_o t + \varphi) - LC\ \omega_0^2\ U_{max}\ \text{Sin}\ (\omega_o t + \varphi) = 0.\ (LC\ \omega_0^2 = 1)$

d) $U_{Cmax} = 10V;\ T_0 = 2\pi.\ 10^{-3}s \Rightarrow \omega_0 = \frac{2\pi}{T_0} = 10^3\ \text{rad}\ s^{-1}$

$u_C(0) = U_{Cmax} \Rightarrow U_{Cmax}\ \text{Sin}\ \varphi = U_{Cmax} \Rightarrow \sin\varphi = 1 \Rightarrow \varphi = \frac{\pi}{2}\ \text{rad}$

4)

a) $I = C\frac{duc}{dt} \Rightarrow$ i est en quadrature avance de phrase par rapport à $u_C \Rightarrow$

$\varphi_i = \varphi_{uc} + \frac{\pi}{2} = \pi\ \text{rad} \Rightarrow i(t) = 0{,}1\ \text{Sin}\ (10^3 t + \pi)$; i en (A) et t en (s).

b) $i = C\frac{duc}{dt} \Rightarrow CU_{Cmax}\ \omega_o\ \text{Cos}\ (\omega_0 t + \varphi) = CU_{Cmax}\ \omega_o\ \text{Sin}\ (\omega_0 t + \varphi + \frac{\pi}{2}) =$

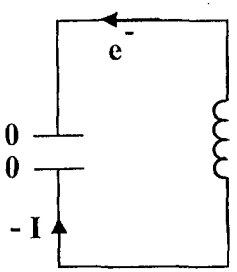
$I_{max}\ \text{Sin}\ (\omega_0 t + \varphi_i) \Rightarrow I_{max} = CU_{Cmax}\ \omega_0.$

c) $C = \frac{I_{max}}{U_{Cmax}\omega_0} = \frac{0{,}1}{10\times10^3} = 10^{-5}\ F\ ;\ \omega_0^2 = \frac{1}{LC} \Rightarrow L = \frac{1}{C\omega_0^2} = 0{,}1H$

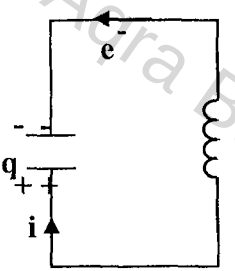
d) $t = \frac{T_0}{4} \Rightarrow u_C = 0$ et $i = -I_{max}$.(u_C (t) est décroissante) $\Rightarrow E_C = 0$ et $E_L = E_{LC}$

$t = \frac{T_0}{2} \Rightarrow u_C = -U_{Cmax}$ et $i = 0 \Rightarrow E_C = E_{LC}$ et $E_L = 0$

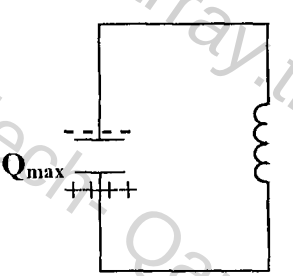
Donc entre $\frac{T_0}{4}$ et $\frac{T_0}{2}$ E_C augmente de zéro à E_{LC} et E_L diminue de E_{LC} à zéro $\Rightarrow$ c'est une transformation de E_L en E_C.



$t = \frac{T_0}{4}$



$\frac{T_0}{4} < t < \frac{T_0}{2}$



$t = \frac{T_0}{2}$

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